Visual and automatic search of lens candidates in the XMM-LSS and XXL fields

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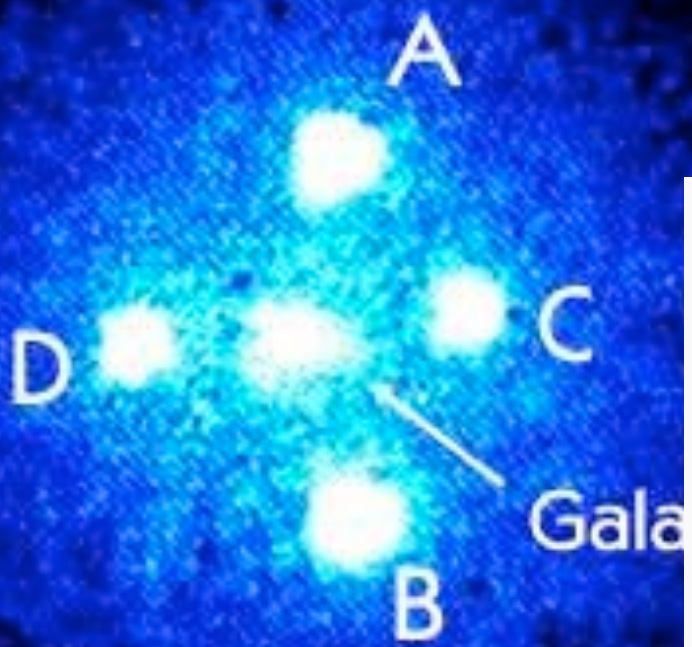
Search of lens candidates

Visual inspection

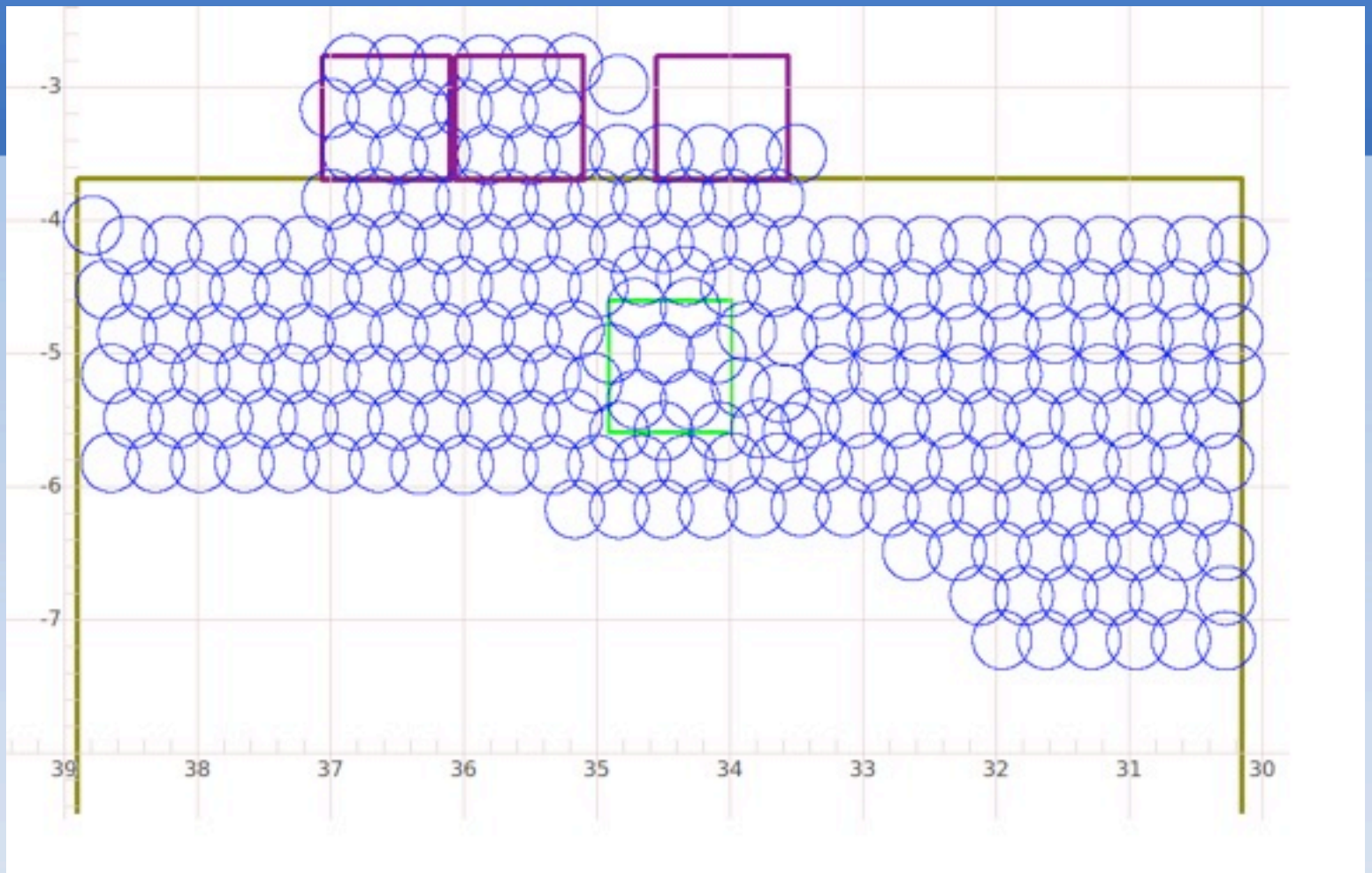


ing

Galaxy

Automatic searching

optical survey in XXL-North

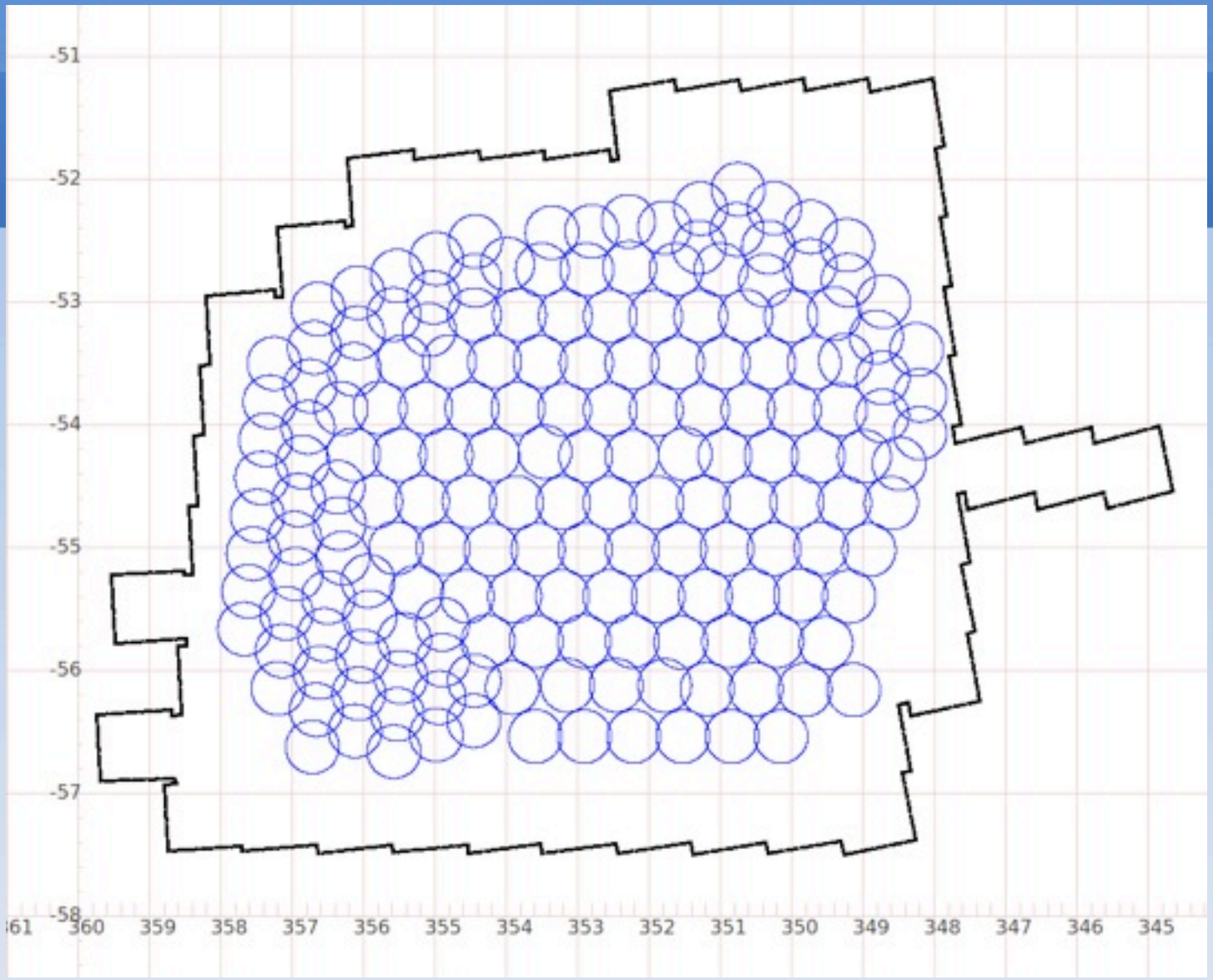


Depth
5σ in mag.

CFHT W1:
23.6-25.5

CFHT ABC:
24.8-26.8

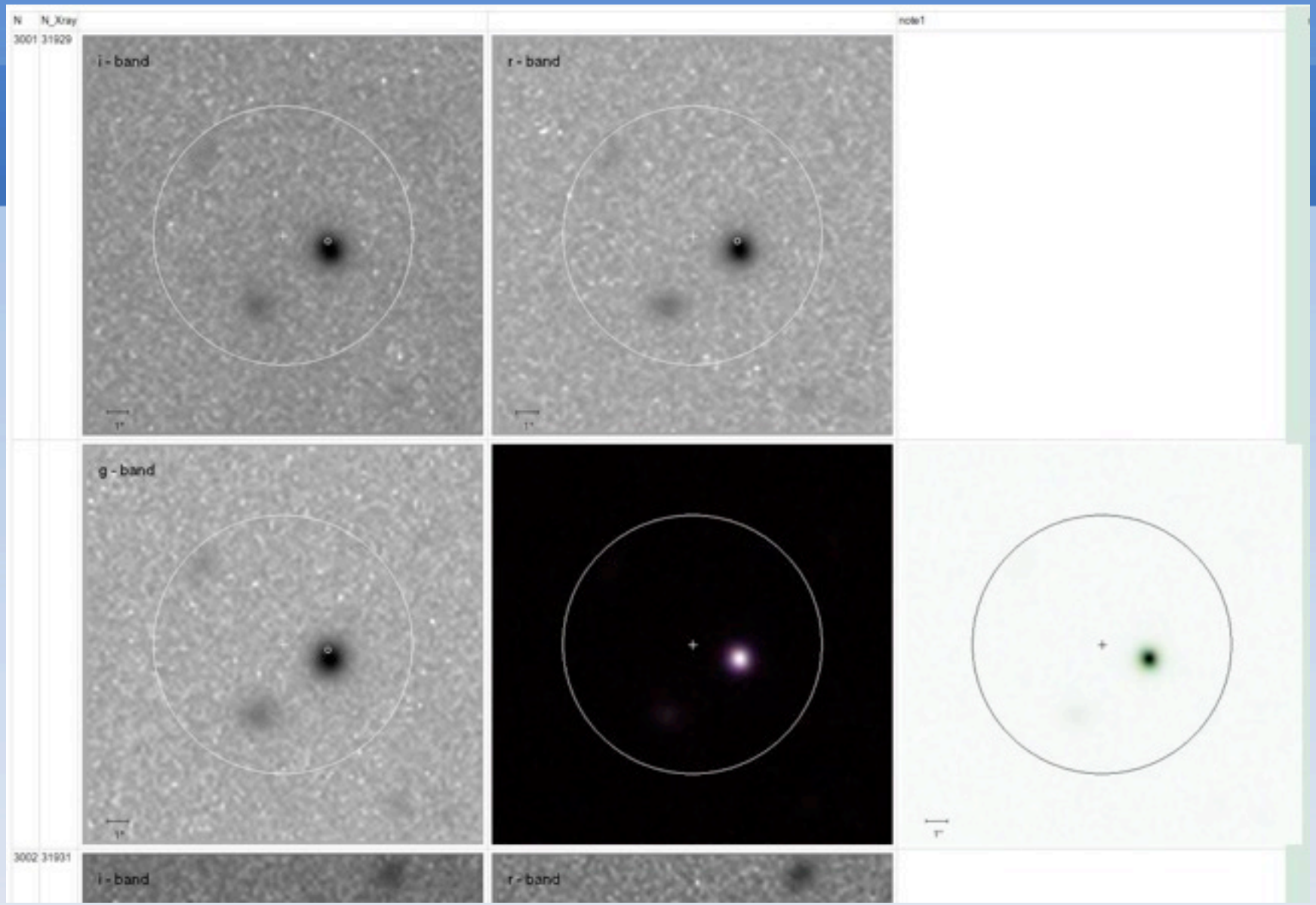
optical survey in XXL-South



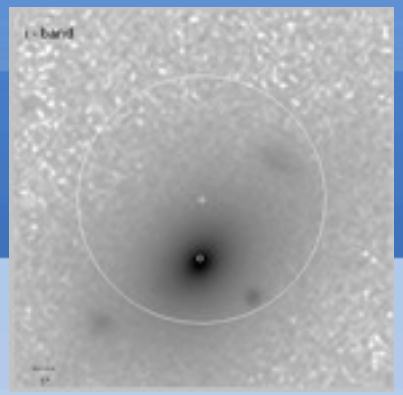
Depth
5σ in mag.

BCS: 23.0-24.8

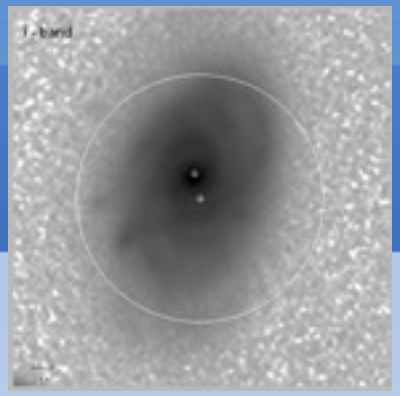
Visual morphological classification in XMM-LSS field



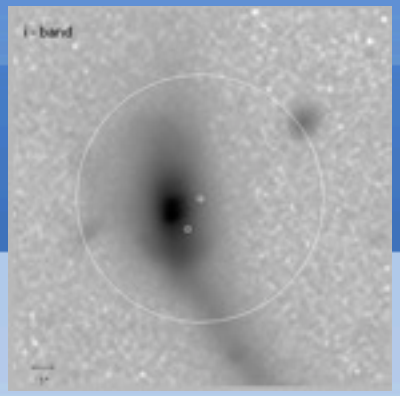
Visual morphological classification



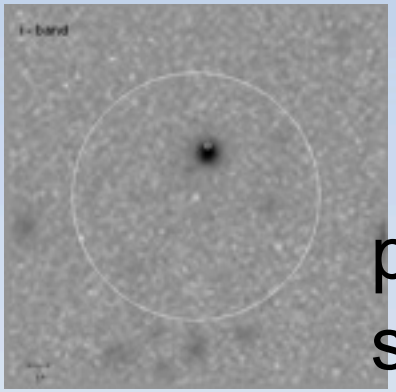
early-type galaxy



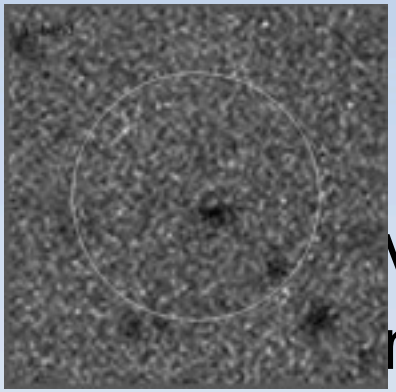
late-type galaxy



merging galaxy

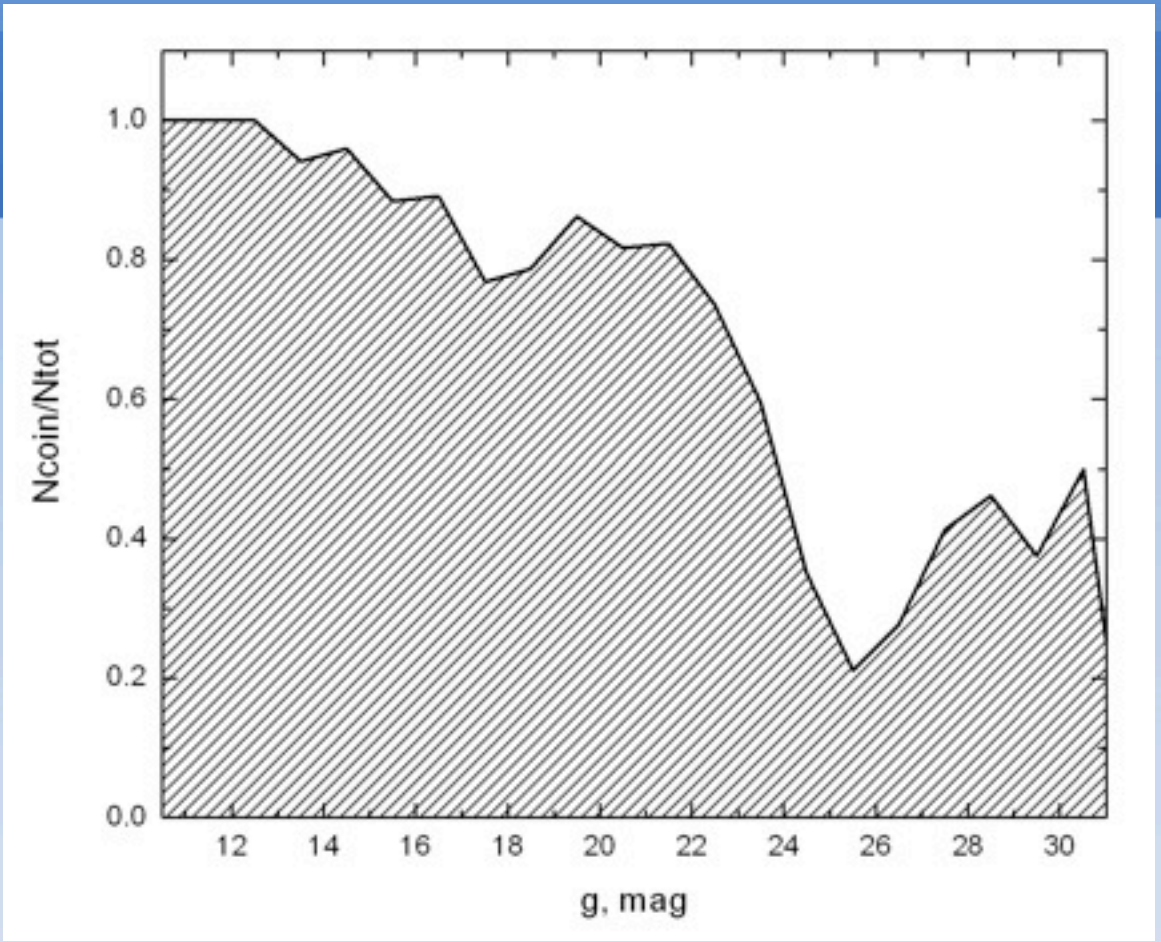


point-like source



very faint or misclassified

Visual morphological classification

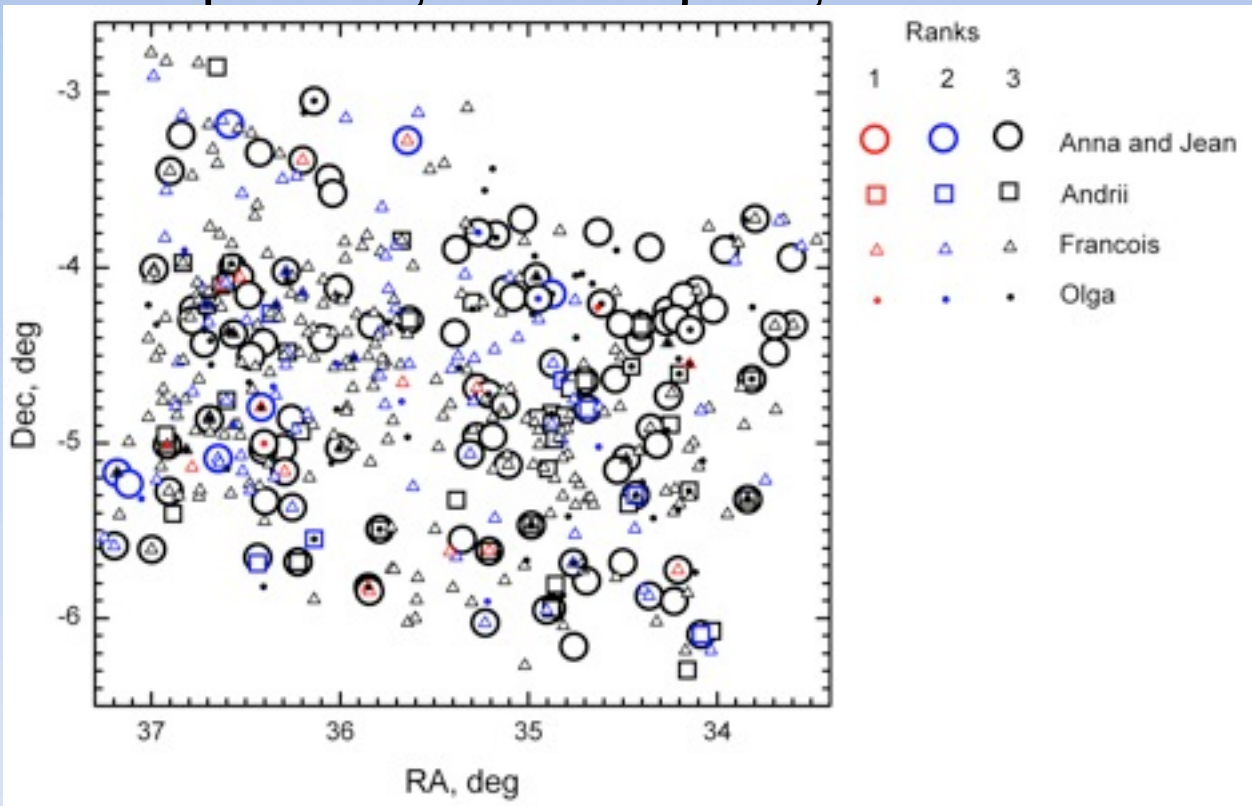


Coincidence of classification between two inspectors

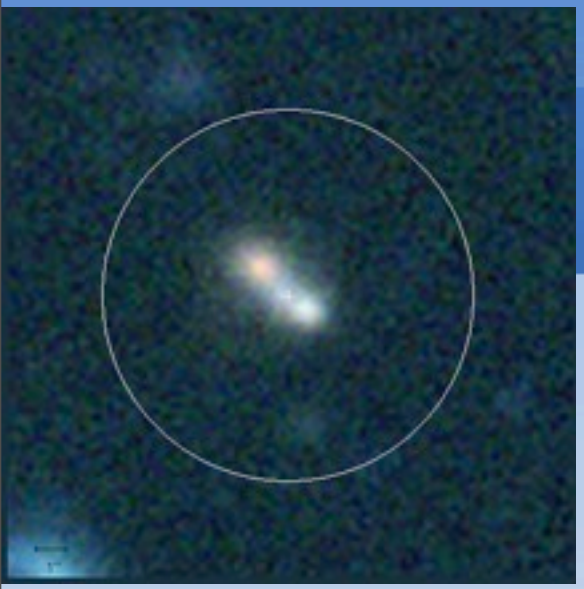
Searching of lens candidates

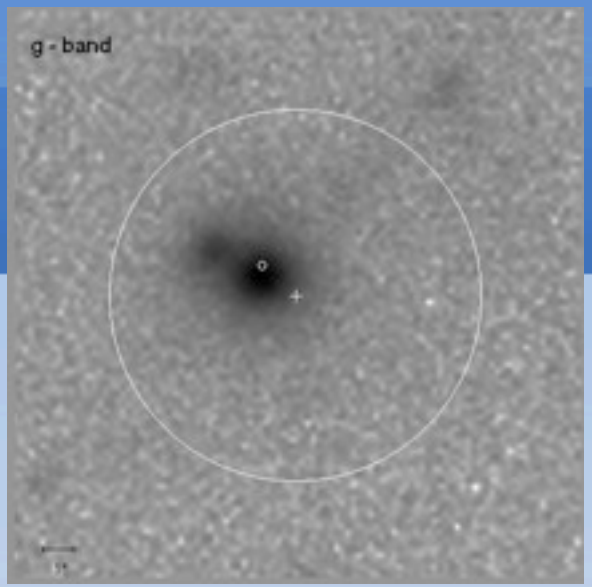
- Rank 1 Good (sure) lens candidate;
- Rank 2 Probable lens candidate;
- Rank 3 Possible lens candidate;

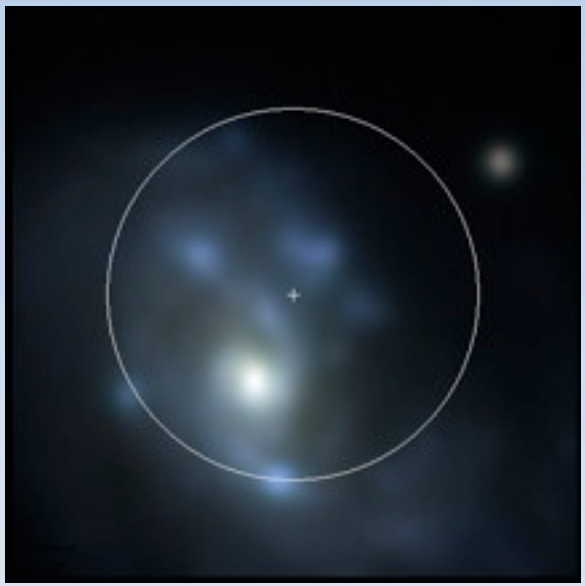
4 independent inspectors, 5142 objects, 477 lens candidates



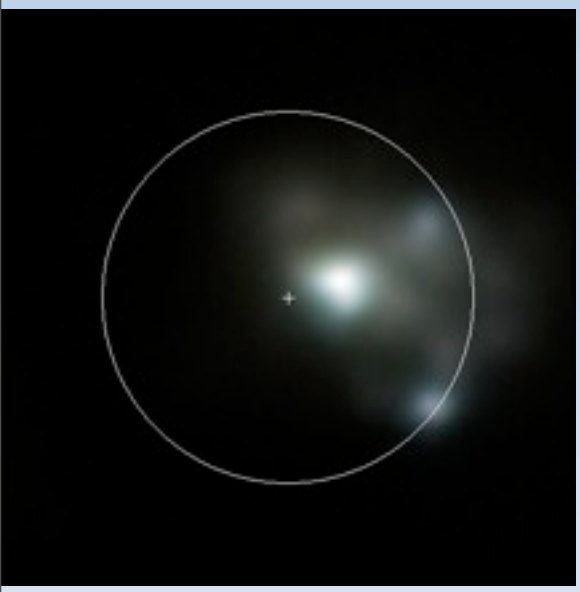
The most interesting candidates

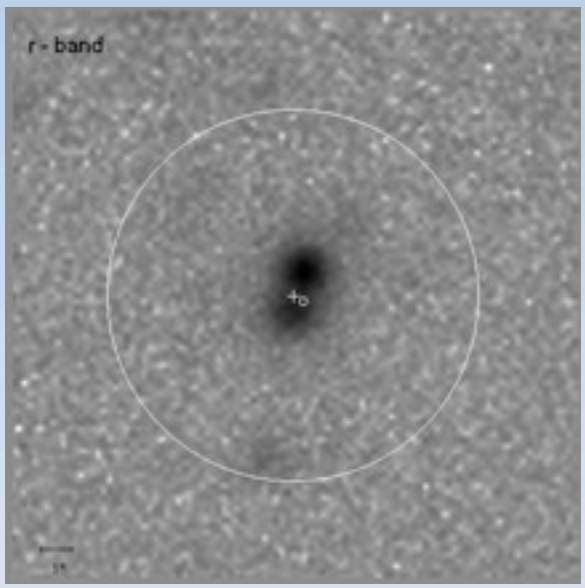


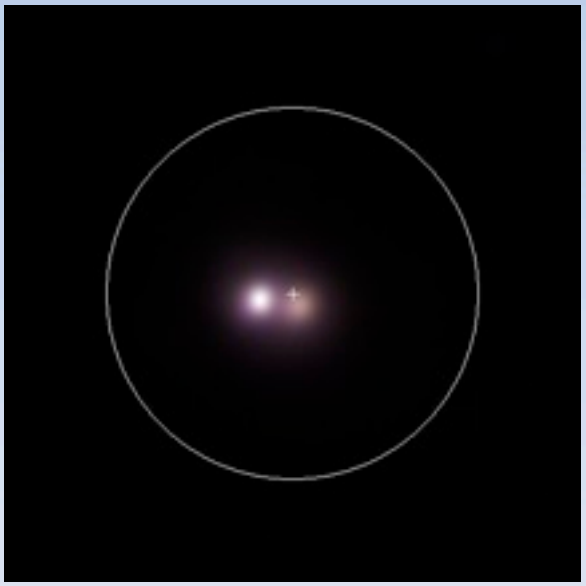




The most interesting candidates



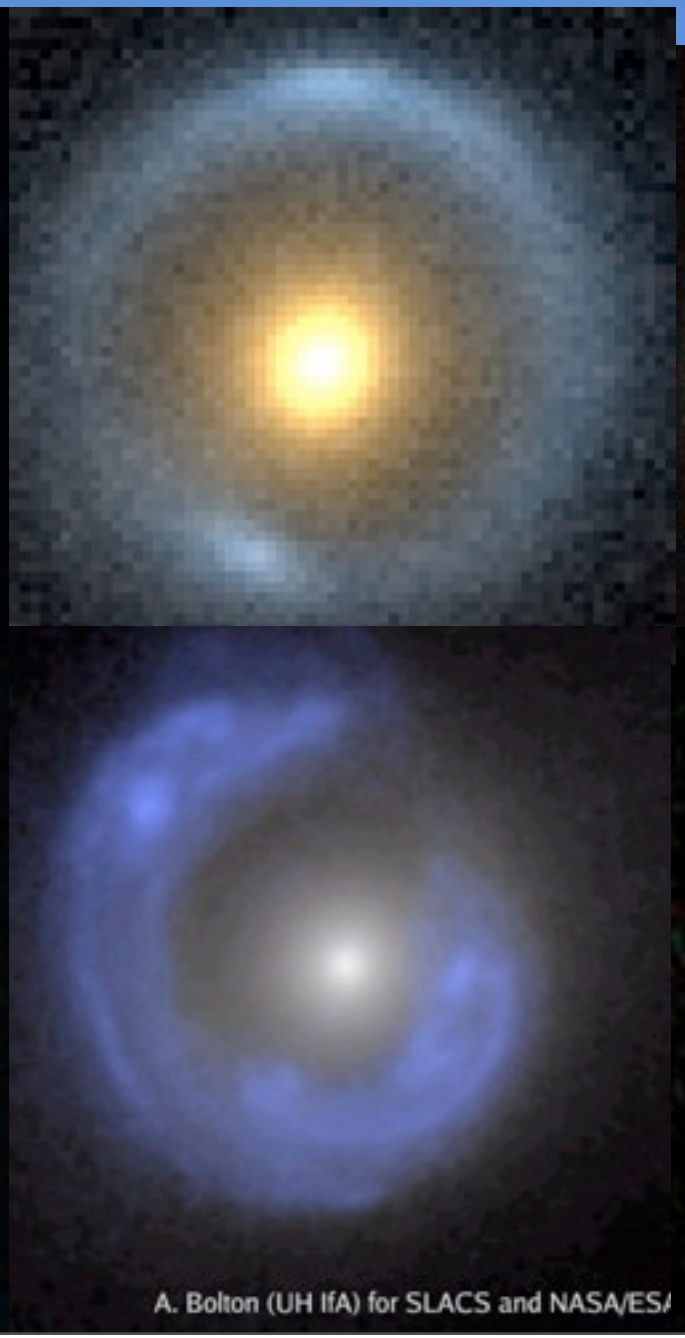




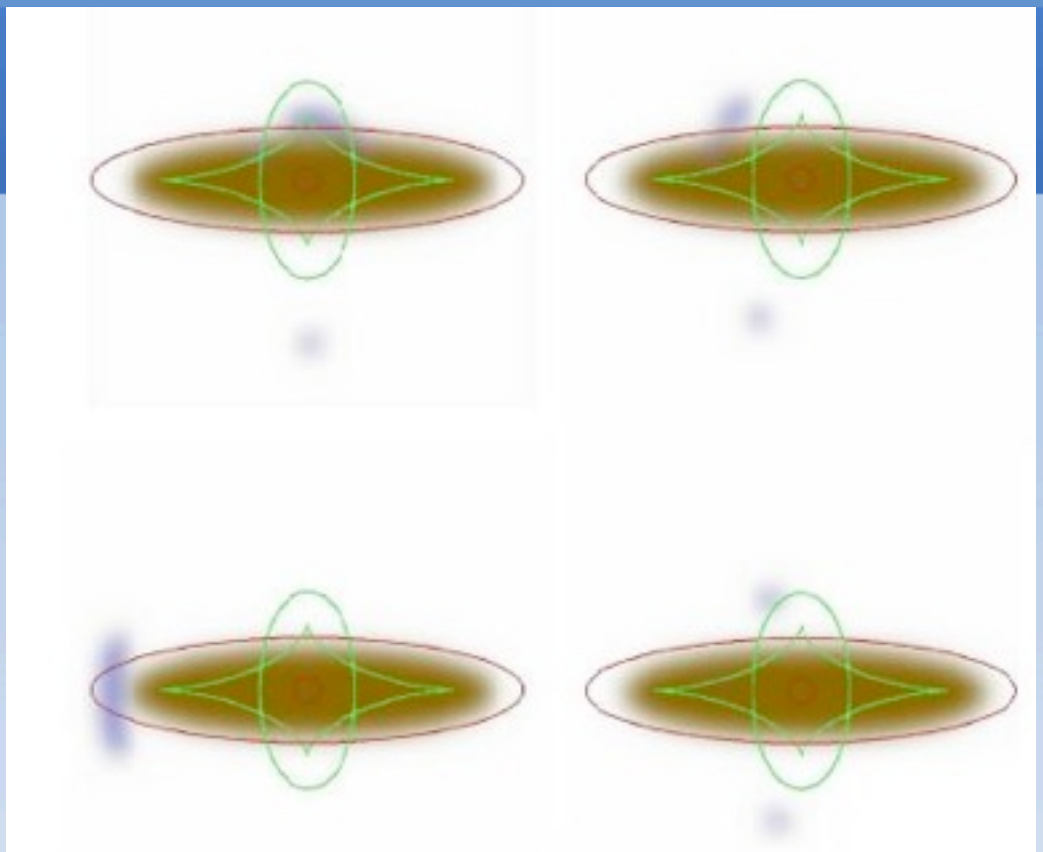
Lens candidates

Einshtein's ring?

Starforming galaxy with ring?



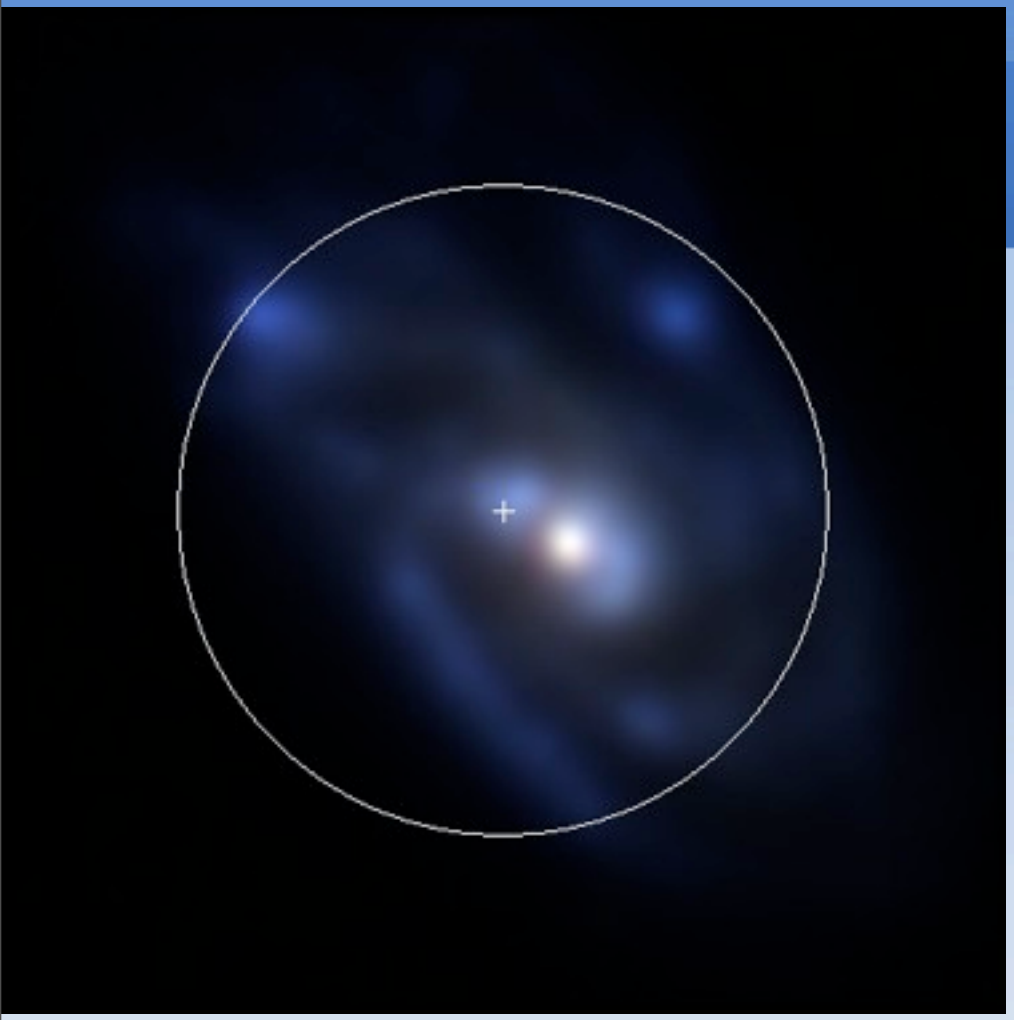
Lens candidate

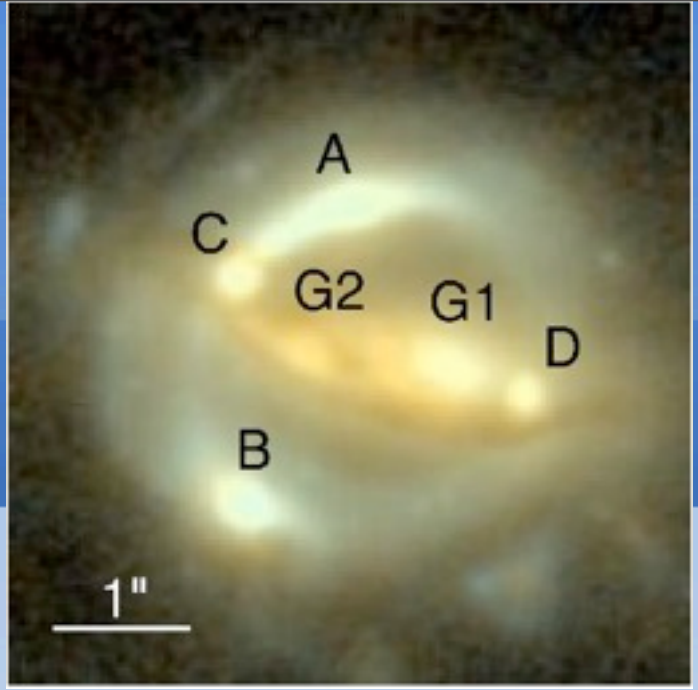


J.F. Sygnet et al (2010)

B1608+656

Lens candidate

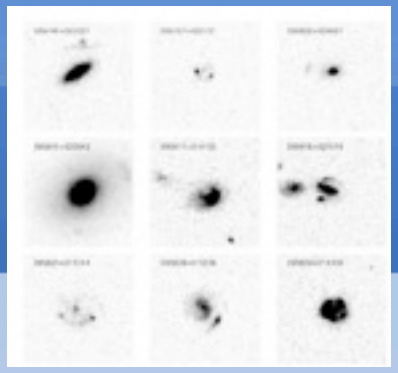




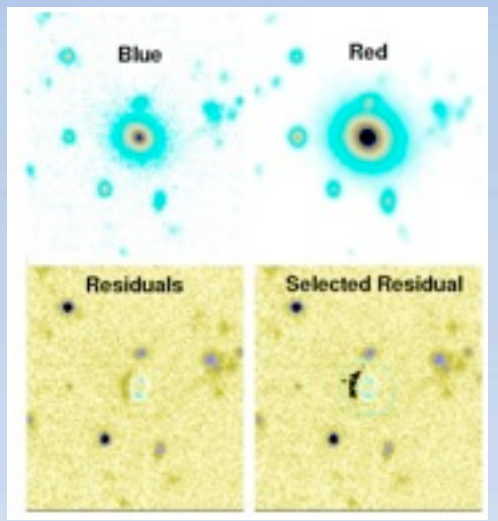
For the verification of lens candidates we need spectroscopy observations!

Automatic searching of lens candidates

Visual: Jackson 2008 Gravitational lenses and lens candidates identified from the COSMOS field



Automatic: Cabanac et al. 2007 - The CFHTLS strong lensing legacy survey. ARC, RING and Multiplet Detectors
More et al. 2011
Sygnet et al. 2010 A search for edge-on galaxy lenses in the CFHT Legacy Survey



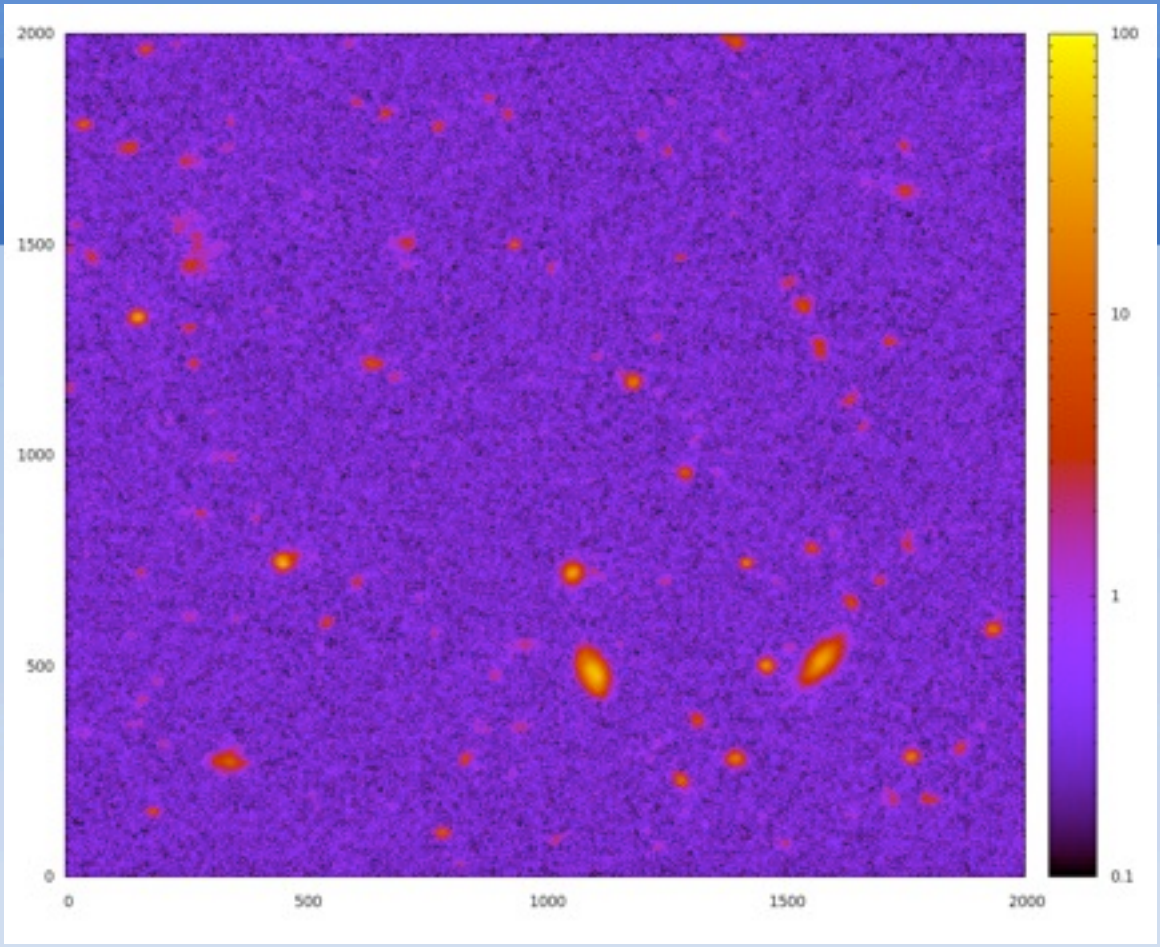
Main aim of our work:
To construct the algorithm for automatic distinguish of the objects on

- point-like and extended
- objects with different morphology
- lens candidates

on the base of PSF fitting

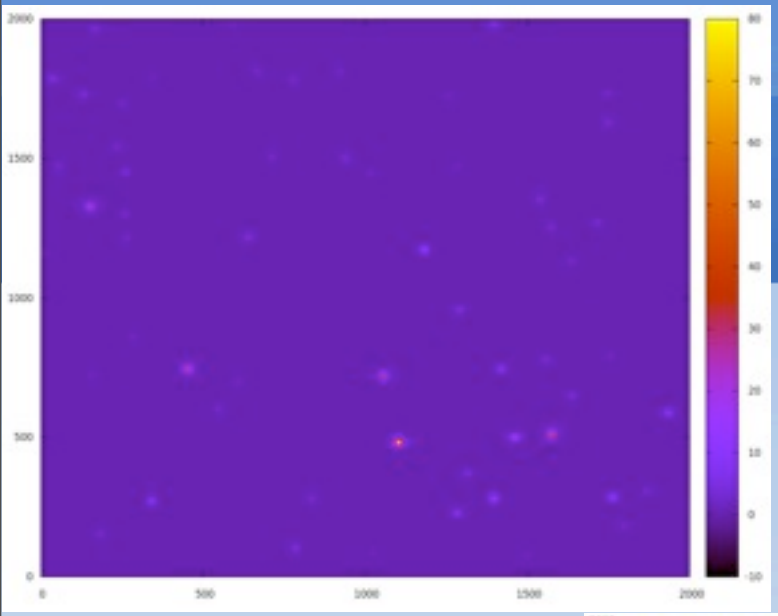
Automatic identification of the sources

CFHT image
g-band
Exposure 3.17 ks
Seeing 0.87"

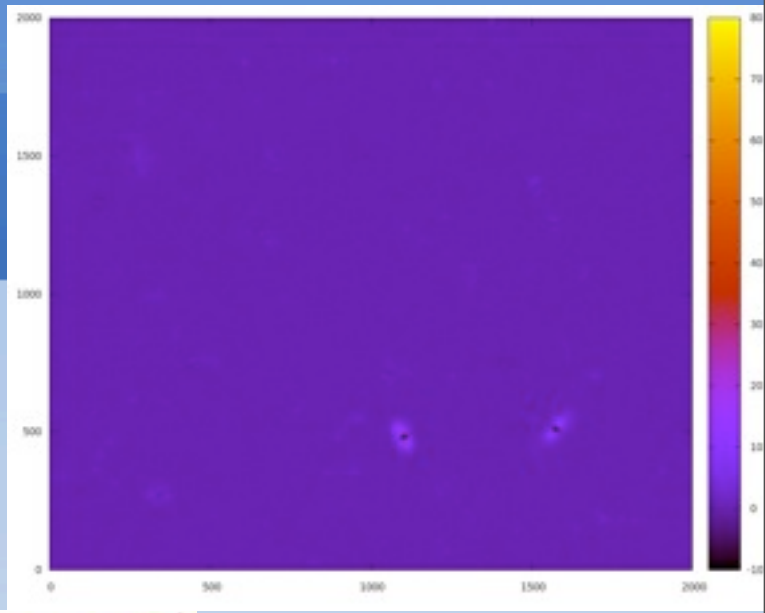


Procedure:
1. Choose the objects brighter than some flux limit.
2. Compose general PSF as accurate superposition of the selected objects.
3. Next we have fitted each object by general PSF. If χ^2 was larger that some limit we marked this object as "bad" and did not consider it in general PSF.
4. Repeat the steps 2 and 3 using only "good" object for the construction of general PSF.
5. After a few iterations when the number of "bad" objects became constant we stop the iterations.
6. Fitting of all objects using the final PSF and construction of the residual map.

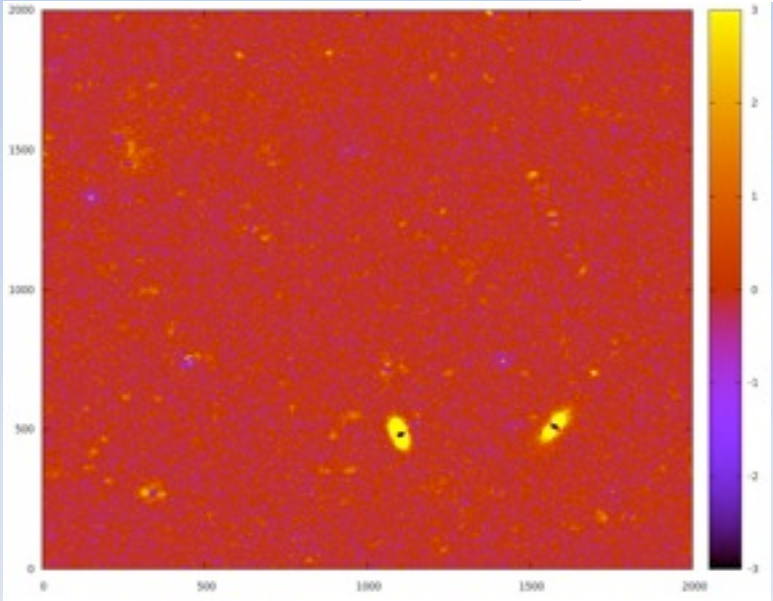
Automatic identification of the sources



composed image

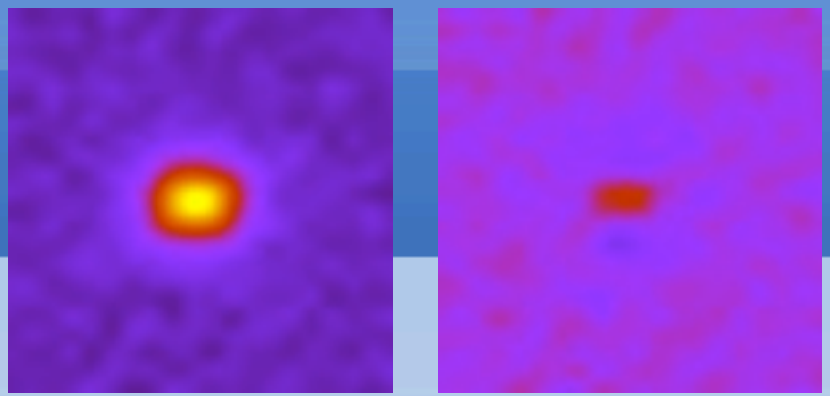


residual image

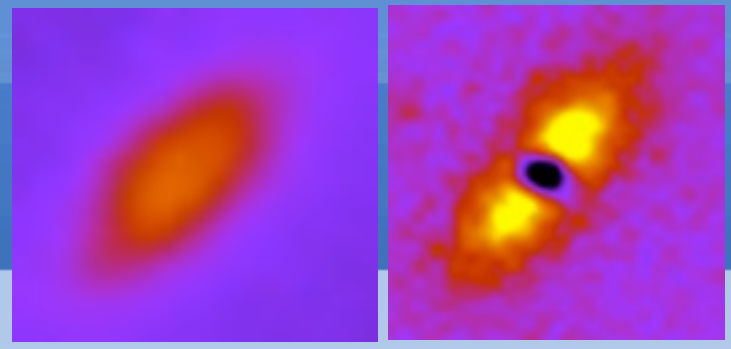


residual image
in sigma units

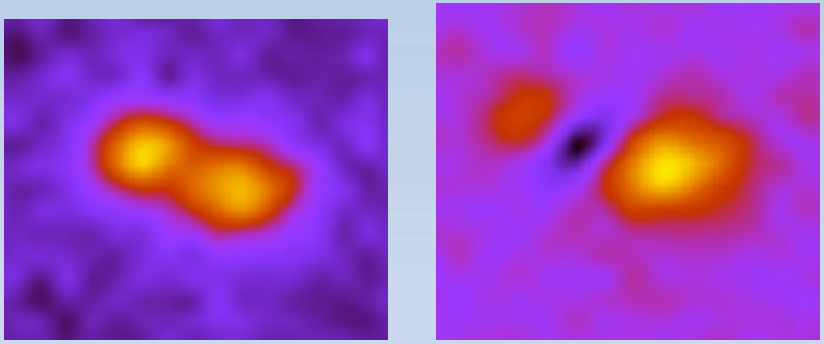
Examples:



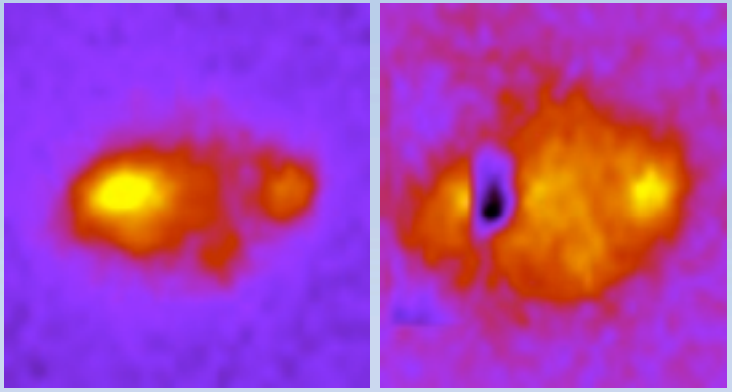
point-like source



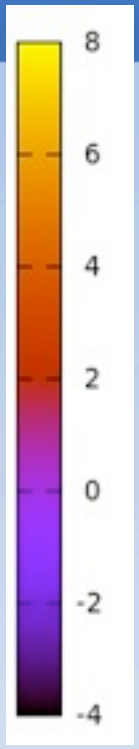
edge-on galaxy



close double system



extended source (peculiar)

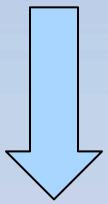


scale,
σ units

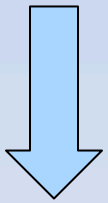
Conclusions

Visually we found a few tens of good lens candidates in XMM-LSS field which need detail spectroscopy.

- We are constructing algorithm for automatic distinguish of the objects on:
- point-like and extended (for quick choice of templates at photo-z calculations)



- different morphological types of extended sources



- lens candidates